AMENDMENTS TO THE CLAIMS

Please amend Claims 4, 5, 7-11, 14 and 16 as follows.

1. (Original) A tire slip state detecting method for detecting a slip state in a contact region of a tire which is rotating on a road surface, the method comprising:

an acquiring step for acquiring measurement data of acceleration at a tread portion of the rotating tire for a duration corresponding to at least one round of tire rotation, the measurement data including at least measurement data of acceleration in a radial direction of the tire;

a contact region determining step including,

extracting time series data of acceleration due to tire deformation from the acquired measurement data in the radial direction,

subjecting the time series data of acceleration due to tire deformation to a time integration of second order to obtain displacement data, thereby calculating a deformation in the tread portion of the tire, and

determining, from the calculated deformation, a contact region of the tire during rotation;

a slip region specifying step for specifying, from the measurement data of acceleration acquired in the acquiring step, a slip region within the determined contact region.

2. (Original) The tire slip state detecting method according to claim 1, wherein in the slip region specifying step, high frequency components of a predetermined frequency range is extracted from the measurement data of acceleration acquired in the acquiring step to specify the slip region based on an amplitude level in the high frequency components.

3. (Original) The tire slip state detecting method according to claim 2, wherein the slip region is specified when a frequent number of occurrences in which an amplitude level of the high frequency components exceeds a reference value, is higher than a predetermined frequent number.

4. (Currently amended) The tire slip state detecting method according to ~~any one of~~ claims 1 ~~to 3~~, wherein in the slip region specifying step, an area ratio of the slip region to the contact region is calculated to evaluate the slip state in quantity.

5. (Currently amended) The tire slip state detecting method according to ~~any one of~~ claims 1 ~~to 4~~, wherein the contact region determining step including:

a step of dividing a region on a circumference of the tread portion of the tire into a first region including a contact region in contact with the road surface, and a second region including other than the first region, approximating the measurement data in the radial direction in the second region to calculate a first approximation curve defined in the first and second regions, and subtracting the first approximation curve from the measurement data in the radial direction to extract time series data of acceleration due to tire deformation in the first and second regions; and

a step of dividing a region on the circumference of the tread portion of the tire into a third region including a contact region in contact with the road surface, and a fourth region including other than the third region, and approximating the displacement data in the fourth region to calculate a second approximation curve defined in the third and fourth regions, and subtracting the second approximation curve from a waveform of the displacement data to calculate a deformation of the tire.

6. (Original) The tire slip state detecting method according to claim 5, wherein the first approximation curve is a curve which approximates the measurement data in the radial direction in the first region in addition to the second region, using a plurality of data points of the measurement data in the radial direction in the second region as nodes.

7. (Currently amended) The tire slip state detecting method according to claim 5 ~~or 6~~, wherein the first approximation curve is a curve calculated by applying weighting coefficients to the time series data of acceleration in the first region and to the time series data of acceleration in the second region; and a greater weighting coefficient is applied to the time series data of

acceleration in the second region than a weighting coefficient applied to the time series data of acceleration in the first region to approximate the time series data of acceleration in the first and second regions.

8. (Currently amended) The tire slip state detecting method according to claim 5 ~~or 7~~, wherein the second region and the fourth region have an angle in a circumferential direction of at least 60 degree in absolute values, the angle being obtained relative to a center position of the contact region of the tire.

9. (Currently amended) The tire slip state detecting method according to claim 5 ~~or 8~~, wherein the second approximation curve is a curve which approximates the displacement data in the fourth region in addition to the fourth region, using a plurality of data points in the displacement data in the fourth region as nodes.

10. (Currently amended) The tire slip state detecting method according to claim 5 ~~or 9~~, wherein the second approximation curve is a curve calculated using a least squares method by applying weighting coefficients to the displacement data in the third region and to the displacement data in the fourth region, and a greater weighting coefficient is applied to the displacement data in the fourth region than a weighting coefficient applied to the displacement data in the third region to approximate the displacement data in the third and fourth regions.

11. (Currently amended) The tire slip state detecting method according to ~~any one of~~ claims 1 ~~to 10~~, wherein the measurement data of acceleration is obtained through an acceleration sensor arranged on the tread portion of the tire.

12. (Original) The tire slip state detecting method according to claim 11, wherein a plurality of acceleration sensors are arranged on the circumference of the tread portion of the tire.

13. (Original) The tire slip state detecting method according to claim 11, wherein the plurality of acceleration sensors are arranged in a width direction of the tread portion of the tire.

14. (Currently amended) The tire slip state detecting method according to ~~any one of~~ claims 1 ~~to 13~~, wherein the contact region is determined by obtaining two positions at which the tire series data of acceleration due to tire deformation crosses an acceleration of zero, and by taking the two positions as a leading edge and a trailing edge of the contact region of the tire.

15. (Original) The tire slip state detecting method according to claim 14, wherein the time series data of acceleration due to tire deformation which is used in the determination of the contact region is obtained by subjecting the calculated deformation of the tread portion to a differentiation of second order with respect to time.

16. (Currently amended) The tire slip state detecting method according to ~~any one of~~ claims 1 ~~to 14~~, wherein a deformation shape of the tire is obtained from the displacement data, and the contact region is determined by defining positions at which the tire deformation shape crosses a line having a certain distance in an upward direction away from a lowest point in the tire as a leading edge and a trailing edge of the contact region.

17. (Original) A tire slip state detecting apparatus for detecting a slip state in a contact region of a tire which is rotating, the apparatus comprising:

an acquiring unit for acquiring measurement data of acceleration at a tread portion of the rotating tire for a duration corresponding to at least one round of tire rotation, the measurement data including at least measurement data of acceleration in a radial direction of the tire;

a contact region determining unit for

extracting time series data of acceleration due to tire deformation from the acquired

measurement data in the radial direction,

subjecting the time series data of acceleration due to tire deformation to a time integration of second order to calculate displacement data, thereby calculating a deformation in the tread portion of the tire, and

determining, from the calculated deformation, a contact region of the tire during rotation; and

a slip region specifying unit for specifying, from the measurement data of acceleration acquired in the acquiring step, a slip region within the determined contact region.